

Task 4.1 Indicators

Methodological paper for the selection and application of PEGASO ICZM indicators

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This methodological paper summarises the rationale for the development of the PEGASO indicator set, and defines the methodological steps for the test and application of the indicators at different spatial scales

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1. Introduction

1.1 Purpose of the methodological paper

The aim of this paper is to provide the description of the approach used to develop the ICZM PEGASO indicator set and the guidelines for the application phase (how to select, and how to apply the indicators).

In particular, after presenting the role of the indicators in the PEGASO project (chapter 1), the purpose of the indicators within the ICZM framework and its role in the ICZM protocol are described (chapter 2).

Moreover in chapter 3 the methodology used for the development of the indicator set is explained starting from the review phase up to the final indicators factsheet. Finally some guidelines for the selecting and application of the indicators in the PEGASO project is presented.

This document will be circulated among PEGASO partners and CASES for further contributions and in order to facilitate the testing phase of task 4.1.

In its final version, after feedback information on the application phase will be collected and analysed, the paper will be made available in the 'PEGASO Coastal Wiki' as an article with interactive features (hyperlinks, reference reading, linkage with articles on ICZM process and policies), allowing for discussion within the Coastal Wiki community.

1.2 The role of Indicators in the PEGASO project

The main objective of PEGASO is to build on existing capacities and develop common novel approaches to support integrated policies for the coastal, marine and maritime realms of the Mediterranean and Black Sea Basins in ways that are consistent with and relevant to the implementation of the ICZM Protocol for the Mediterranean.

In this context, the aim of Work Package 4 of PEGASO is to refine and further develop efficient and easy to use tools for making sustainability assessments in the coastal zone.

Task 4.1 is meant to provide a suite of indicators that can be applied at different scales, both in the Mediterranean and Black sea, as sustainability assessment tool, and as tool to measure the implementation of ICZM policy and programmes.

Within PEGASO framework, the set of indicators provided by task 4.1 is meant to:

- Provide the partners responsible of the [CASES](#) with a simply and ready to use set of indicators;
- Support the work of the Regional Assessment in the Mediterranean and Black Sea basins;
- Provide the PEGASO end-users with a set of indicators which could then be used for the implementation of ICZM Protocol for the Mediterranean and of other relevant policy frameworks (e.g. EU Marine Strategy Framework Directive, EU Water Framework Directive).

As can be seen in Fig. 1, Task 4.1. is structured through three steps:

- a) **review of existing indicator initiatives** to measure the progress towards sustainable development in coastal zones, in particular for the Mediterranean and Black Sea Basins;
- b) **assessment of these** initiatives against the needs of relevant policy instruments (EU ICZM Recommendation, EU Marine Strategy Framework Directive), EU policies related to the marine and maritime environment (habitat and bird directives, floods directive, bathing water directive, water framework directive, marine strategy framework directive, common fisheries policy (in review), the integrated maritime policy, etc.) the Bucharest Convention, ICZM Protocol for the Mediterranean);
- c) **definition of new indicators** where necessary, taking into account existing recommendations for ICZM indicators

As a result of this work, **a core set of indicators** will be identified to support ICZM across the Mediterranean and Black Sea regions; they will cover both biophysical issues and socio-economic themes, and especially take into account the threats to the coastal zone. A multi-scale approach to indicator design has been adopted, to take into account the needs at local, national and regional scales. The work will identify the data and statistics needed to populate and maintain the indicators, and the outputs will be tested iteratively with end-users, across the region and within the 10 Cases areas.

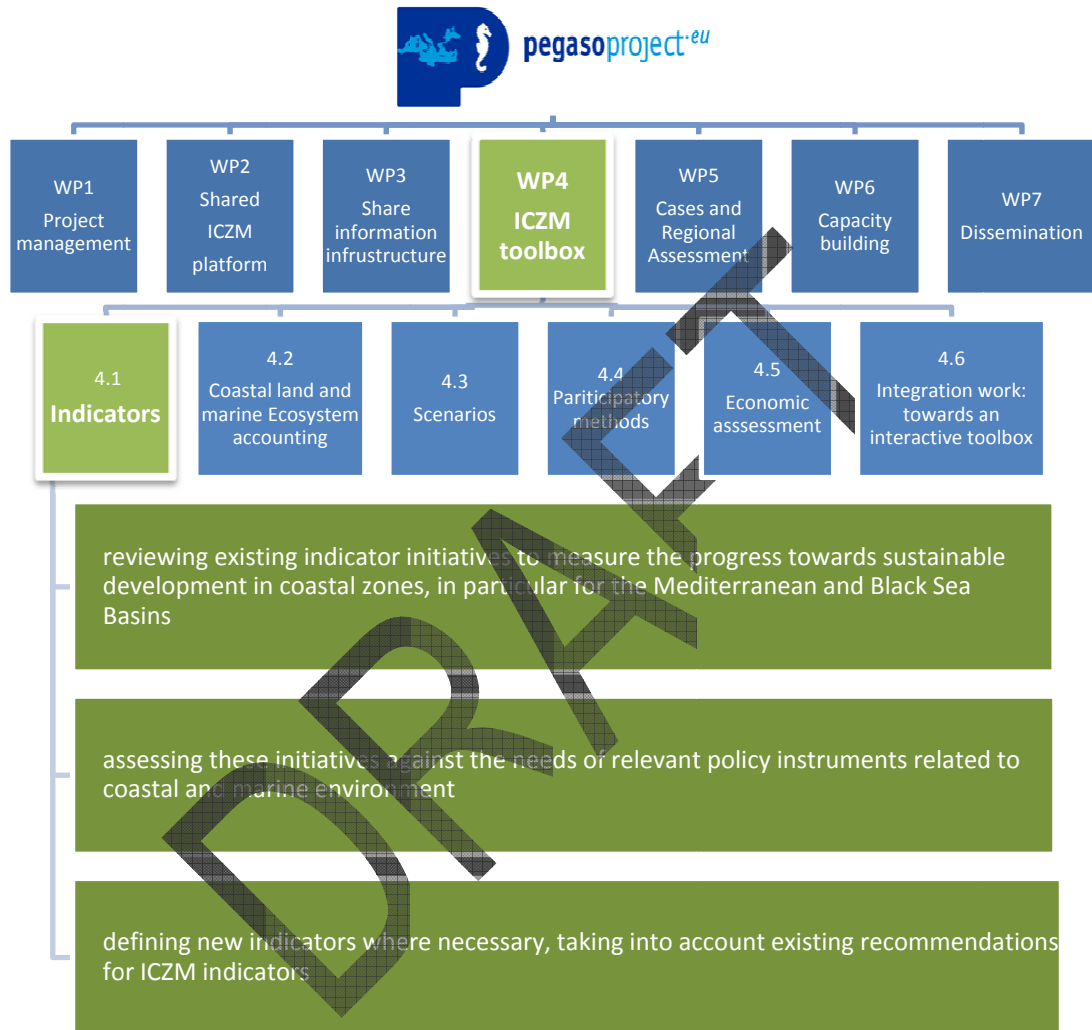


Figure 1 PEGASO Task 4.1 objectives

2. Indicators for Integrated Coastal Zone Management (ICZM)

In this chapter a description of the purpose of using indicators in the ICZM policy and programmes is provided (2.1) and then the indicators requirements of the implementation of the ICZM Protocol are presented (2.2).

2.1 The purpose of using indicators in ICZM processes

A structured approach to ICZM calls for indicators to measure progress in, and effects of, ICZM policies. Initiating, monitoring or evaluating an ICZM process, requires a set of governance, environmental, and socio-economic indicators that should relate to the specific management issues that triggered the initiation of the ICZM process, such as multiple conflicts, ecological degradation, community interest or the need for implementing a specific legislation (IOC-UNESCO, 2006). The purpose of using indicators in ICZM processes includes:

1. Monitoring key characteristics of coastal and marine ecosystems against desired conditions.
2. Evaluating coastal management options.
3. Tracking progress and effectiveness of implemented measures and actions.
4. Taking into consideration the short, and the long-term objectives of the plan.
5. Guiding adaptive management.
6. Helping in implementing the ecosystem approach.
7. Helping providing, and helping communicating relevant information to decision-makers.

2.2 Indicators requirements for the implementation of the ICZM Protocol

The ICZM Protocol for the Mediterranean, signed in Madrid in 2008, and ratified in March 2011 represents a milestone for what regards the implementation of ICZM in the Region, but also for the example it might represent to other Regional Seas. Furthermore, the Protocol represents a novelty being bold, innovative, forward looking, proactive, comprehensive, and integrated. For what regards the indicators, Article 27 specifically states that the Parties shall:

- *define coastal management indicators, taking into account existing ones, and cooperate in the use of such indicators;*
- *establish and maintain up-to-date assessments of the use and management of coastal zones*

Considering that one of the main aims of ICZM is the sustainable use of coastal resources, the indicators needed for the implementation of the ICZM Protocol should be then primarily linked with the pillars of Sustainable Development, and should be grouped into the three main categories:

- **Environmental;**
- **Economic;**
- **Social.**

Furthermore, a fourth category of indicators needs to be considered, **Governance** indicators *“in order to evaluate the effectiveness of ICZM strategies, plans and programmes, as well as the progress of implementation of the Protocol”* (Art. 18).

Therefore the indicators for the Protocol can be grouped in the following categories:

- **Compliance indicators (or Performance Indicators)** with the Protocol; reporting degree of compliance in the implementation of the Protocol articles, according to the Reporting format to the Compliance Committee;

- **Effectiveness indicators (or Impact indicators)** - to measure to which degree the Protocol is effective in achieving its objectives/ how successfully the Protocol is implemented;
- **Coastal management indicators (or Sustainable Development Indicators):** assessments, state of the coastal environment, trends, etc.

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3. PEGASO Indicators: the approach

In this chapter the approach used to select the ICZM indicator set for PEGASO is described. First the results of a review of the major initiatives regarding indicators are presented (3.1), following, the methodology used to select the set and the core set of the indicators is described (3.2). In paragraph 3.3 the links between the indicators and the other PEGASO tools are shown and in 3.4 the indicators factsheet template integrating all the most relevant information of indicators is depicted. Finally in 3.5 the approach to be used in the selection and test of the indicators by the end users of the PEGAS platform (incl. CASES, experts, and partners involved in Regional Assessment) is described.

3.1 ICZM indicators review: current status

In order to make use of the already existing initiatives on ICZM indicators a review has been undertaken. For complete information on the review undertaken we refer to the [Report 4.1.input in deliverable](#); however, a summary of the major initiatives reviewed is provided below.

Plan Bleu (Med Sea):

At the 12th Conference of the Contracting Parties to the Barcelona Convention (Monaco, November 2001) the 21 Mediterranean rim countries and the European Community decided to prepare a "[Mediterranean Strategy for Sustainable Development](#)". Plan Bleu has been in charge of the technical coordination, and the writing of the draft of the Strategy under the authority of the Coordinator of the MAP, and with the support of the other MAP Regional Activity Centres. The Mediterranean Strategy calls for action to pursue towards sustainable development goals so as to strengthen peace, stability, and prosperity. It takes into account the weaknesses of the region and the threats it faces, but also its strengths and opportunities. It also considers the reality of the gaps between the developed and developing countries, and lays the stress on the necessity to help the transition of the Mediterranean countries of the East Adriatic, the South and the East. The Strategy is structured around four objectives and seven interlinked priority fields action. Thirty-four indicators are annexed to enable the follow-up of the Strategy.

The **four main objectives** are:

- i) contribute to economic development by enhancing Mediterranean assets;
- ii) ii) reduce social disparities by implementing the UN Millenium Development Goals and improve cultural integration;
- iii) iii) change unsustainable production and consumption patterns and ensure the sustainable management of natural resources;
- iv) iv) improve governance at the local, national, and regional levels.

The seven **priority fields of action** are water resources; energy management and addressing impacts of climate change; transport; tourism; urban development; agriculture and management of the sea; coastal areas and marine resources. A set of fact sheets related to the MSSD follow-up indicators is available on the website.

IOC UNESCO handbook (global):

This Pilot Program was established in 2003 under the auspice of IOC of UNESCO, and in collaboration with the Department of Fisheries and Oceans (Canada), NOAA (United States), and the Gerard J. Mangone Center for Marine Policy (University of Delaware) to promote the development and use of Integrated Coastal and Ocean Management (ICOM) indicators. The IOC-Pilot Project intends to promote a more outcome-oriented approach to the selection and application of indicators to measure the progress and effectiveness of ICOM interventions. The main project output is the development of a *Handbook for Measuring the Progress and Outcomes of Integrated Coastal and Ocean Management*, by an international group of leading experts in ICM. The structure of the handbook is built around three main types of indicators— [ecological](#), [socioeconomic](#), and [governance](#)

[performance](#) — and the [ICM policy cycle](#), and includes an introduction to ICOM, suggestions on how to optimize relationships among these dimensions, and elements for further research on indicators. In order to validate and receive feedbacks from potential users, the Handbook is being tested in existing ICOM programmes and projects around the world.

DEDUCE (EU level):

The DEDUCE project provided a testing ground for the proposed set of ICZM indicators (proposal from the EU ICZM Expert group) by further defining the broad conceptually identified 'indicators' as operational and replicable 'measurements' (defining temporal and spatial scale, data sources, units of measurements and specific calculation methods), and by testing them in different countries and coastal areas in the EU. These measurements are fully described in technical sheets which are digitally available from www.deduce.eu. The DEDUCE project also provided specific recommendations to further refine the ICZM indicator set and the need for a sustainability assessment framework. The added value of the DEDUCE indicator set is the EU country's validation and agreement it received as a first basic set.

Out of this review, more than 300 indicators were initially identified. As a second step the indicators present at least in two reviewed initiatives were selected. Then a further review was made by looking at the actual formulation (wording) of the single indicators. It was noticed that even if some indicators had a different working that were referring to the same objective. Therefore, after this process some indicators not included in the first phase were re-introduced in the list. Furthermore, some indicators were included thanks to the contribution of experts that suggested a number of indicators to be added, this happened in particular for economic indicators.

3.2 The approach used in the selection of the indicators

In this chapter the approach used to select the indicators to be applied in the PEGASO project is described starting from the ICZM Protocol policy objectives (3.2.1) used to select the indicator set (3.2.2) wherein the core set of indicators was chosen (3.2.3). Finally the testing phase of the indicators in Pegaso is explained (d).

3.2.1 Selecting the policy objectives to be considered by the indicators

In order to promote an integrated approach and to overcome the traditional sectorial (e.g. fishery, tourism, energy) approach and in accordance with the DEDUCE approach, it has been decided to **link the PEGASO set of indicators to the 10 ICZM policy objectives, reflecting the principles of ICZM which can be found in Article 6 of the Protocol**. The 10 policy objectives are taken from PEGASO Draft Deliverable 2.1.1a, in which the ICZM principles from the Protocol were redrafted in order to reflect the relationship between Integrated Coastal Zone Management and the Ecosystem Approach.

Furthermore the policy objectives were linked also to specific ICZM Protocol articles which reflect these ICZM principles, as redrafted in this conceptual paper in the table in ANNEX I.

Thematic indicators will be taken into account but the selection and the application of the indicators in the application should be able to provide information around integrated coastal zone management plan objectives, e.g. how to increase the resilience of coastal zone to natural hazards and climate change impacts rather than finding solutions for coastal erosion.

After a further reflection on the links between indicators and policy objectives a choice was made not to include in the set two policy objectives. This does not mean that we want to omit these two policy objectives because they are not policy relevant.

In particular the policy objective “Not to exceed the carrying capacity of the coastal zone” (art. 6, comma b) was not included in the final selection because after a consultation with PAP/RAC colleagues the need for more research and discussion on the concept “carrying capacity” for coastal zone management emerged. Moreover the policy objective “Adopt a long-term approach to fully take into account temporal scales” was not included because it was realised that this is a cross-cutting policy objective that can be measured by applying indicators related to other policy objectives e.g. those related to the formulation of land use strategies and plans.

3.2.2 From policy objectives to the Indicator set

According to the 8 policy objectives finally retained a set of 67 indicators ([Indicator set file](#)) were selected choosing from the review of Plan bleu, IOC UNESCO. DEDUCE indicators. Every one of the policy objective is represented at least by 4 indicators. Moreover each indicator is linked with the correspondent ICZM Protocol article and ecological objective of UNEP-MAP. These ecological objective have been defined as part of the road map application of the Ecosystem Approach in the Mediterranean and in the view of implementing the EU Marine Strategy Framework Directive. (**Annex II** - coastal ecological objectives)

3.2.3 From the Indicator set to the core set

Starting from the PEGASO indicator set of 67 indicators a sub-set (**core-set**) of 26 indicators was identified (please see table in **Annex III**). The criteria to select them were the following ones:

- Include indicators covering the main priority issues of the ICZM Protocol (e.g. urban sprawl, land use, and coastal habitats)
- Include the indicators for the UNEP-MAP ecological objectives related to coastal zone
- Include the four main economic indicators (i.e. those considered by economic experts as minimum requirement to describe a coastal economy)

For what regards governance (or compliance indicators) a decision was made not to include them in the core set considering that at the regional level the stock-take performed in WP2 will provide the needed information. At CASES level indicators referring to policy objectives governance can be extracted for the indicator set full list.

3.2.4 Core set indicators testing phase

The testing phase of the chosen indicators of the core set will be applied at the two main spatial scales foreseen by the PEGASO DOW: the Regional and the CASES (local national, subregional scale); a Regional Assessment indicator set (RA set) will be selected from the core-set. Moreover, CASES responsible can select from the PEGASO indicator set all those indicators relevant for the specific issues of the CASES

Timing	Start-March2011	Mar2011-Sep2011	Sep2011-Dec2011	Dec2011-Feb2012	Feb2012-April2012
Process	Initial review (from previous initiative)	Second review (check for wording and indicator objective)	Selection of PEGASO set and Approach development	Selection of core set	Development of methodological factsheet Methodological paper First draft of RA set
Product	300 indicator list Input in	300 indicator list revised	PEGASO set	Core set	Methodological factsheet Methodological



Figure 2 The process of selecting the PEGASO indicator set, and its core-sets. A proposal for the RA set can be found in Annex IV

3.3 The methodological Indicator factsheet: Applying integration in the Indicator assessment

For each indicator included in the core set, a **methodological factsheet** (Table 1) is being compiled. The methodological factsheet reflects the way in which the PEGASO indicators have been conceived and organised. The first part of the factsheet illustrates the '*policy context*' which is to say the reference to the ICZM policy objectives, to the Article of the ICZM Protocol and to the UNEP-MAP Ecological objectives.

The second part of the factsheets includes information on the *steps to be followed* to calculate the indicators, and also information related to time frame and the scale at which the indicator is expected to provide most robust output and application (local, (sub)national, regional sea).

The last part refers to the '*assessment context*'. These fields describe the relevance of the indicator within the framework of application: position in the DPSIR framework; category of indicator the methodologies/tools in which the indicator can be instrumental; where available, the definition of quantitative or qualitative targets/thresholds/reference values for the indicator, and the sources of these values. The template of the factsheet can be downloaded from: [PEGASO indicator methodological factsheet](#)

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Table 1 Indicator factsheet template

Indicator (name)	
Nr.	
Objective of the indicator	
Policy context	
ICZM Policy Objective	
ICZM Protocol Article	
Relevance of the indicator for ICZM Phase(s)	
UNEP-MAP Ecological Objective	
Spatial consideration	
Coverage	Resolution
Temporal consideration	
Period	Resolution (time interval or unit)
Parameter(s)	
(i)	
(ii)	
Calculation method	
Steps	Products
1	
2	
...	
Current monitoring	Data sources
Assessment context	
Use of the indicator in previous assessments/initiatives	
DPSIR framework	
Link to anthropogenic pressure	
Sustainability target or threshold	
Link with other assessment tools	
Example of integrated assessment	
Scope for future improvements	
Indicator references (i.e. UNEP, EEA, ...)	

The PEGASO set of ICZM indicators should not only serve as a descriptive but also analytical tool for the understanding of the coastal system, being it a region (the Mediterranean or the Black Sea), a country or a local coastal area. The challenge is to perform an integrated assessment, or to develop a storyline, also at the level of the indicator assessment, both qualitative and quantitative. To achieve this, **cross-linkages between indicators** are needed: between Indicators of Sustainable Development and Indicators of Governance, between Driver, State, Pressure, Impact and Response indicators, cross-cutting issues, themes and sectoral objectives. Particular attention needs to be paid to the **cause-effect relationships** – and to the processes that define these relationships at the scale at which the analysis is conducted - when selecting these cross-linkages. At the regional level for example, to measure the link between increase in volume of handled goods in ports and emission of greenhouse gasses a composite indicator “ton CO2 emission by shipping per annum per unit of handled goods (container, bulk,...) in ports” could be measured. An example at the local level to measure how the increase in tourism overnight stays relates to the creation of local jobs, a composite indicator “number of overnight stays per unit of employment” could be calculated.

3.4 How to select and test indicators from the PEGASO indicator set

After having described the methodology used to develop the indicator set and core set, in this paragraph the approach to be used in the selection (3.5.1) and test (3.5.2) of the indicators by the end users (i.e. CASES and partners involved in Regional Assessment) is described.

To summarise, the following steps should be taken to select and test the indicators:

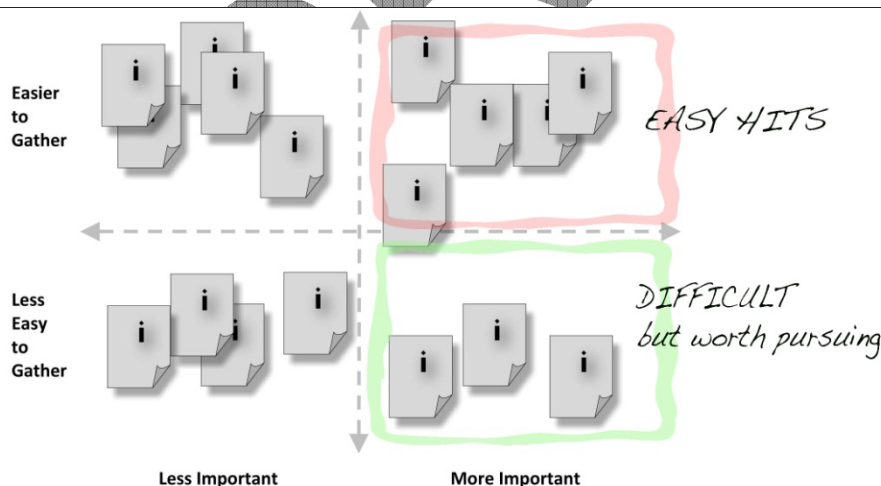
1. Identification of priority ICZM **policy objectives** in the context, scale, region, CASE of application
2. **Selection** of a **sub-set of indicators** from the proposed core set indicators (see matrix in Annex II)
3. **Data collection and calculation** of the selected indicators
4. **Analysis and interpretation** of the results of the indicators calculation in the context of sustainability targets and ICZM policy objective(s), and link with other PEGASO tools
5. Presentation of results to stakeholders
6. Feedback to task 4.1 team on the steps 1-5, through questionnaire

3.4.1 How to choose the indicators

PEGASO indicator set were identified for each broad ICZM policy objective.

Therefore Indicators should be chosen starting from the **identification of the policy objectives** more relevant for the specific coastal system. The process of selection can be done in a participatory manner (cfr [PEGASO indicator methodological factsheet](#)) in order to define, together with the coastal stakeholders, which are the priority issues, how these issues are related to existing policies & plans and their objectives, and which indicators are suitable and appropriate against which to measure and monitor policy (plan/programme) objectives.

When selecting the indicators to be measured in the CASES or for the Regional Assessment also other pragmatic issues should be taken into account. These refer mainly to **relevance and data availability**.



Ranking of Indicators (adapted from CAMP Slovenia 2005)

Figure 3 The identification and collecting of data for measuring indicators can be a very difficult and challenging process. Therefore, a simple, preliminary ranking of relative importance of the main types of indicator in relation to the ease of gathering will facilitate the process (see figure 2).

3.4.2 Testing the chosen indicators

The final aim of the task 4.1 is to provide a robust set of indicators for the ICZM community in the Mediterranean and in the Black Sea. Therefore, a number of important issues have to be considered when testing the indicators both in the CASES and in the Regional Assessment. Feedbacks on these issues should be provided at the end of the testing phase in order to, where needed, modify or even exclude some of the indicators included in this first PEGASO indicator set. To capture the experiences and lessons learnt during these test phases in different regions, a questionnaire is circulated that will provide the necessary feedback to the Task 4.1. team (see feedback questionnaire in Annex III).

The **main issues** are the following ones:

- we need to test relevance of ICZM indicator at different spatial scales in different policy environments and different policy objectives (**indicator robustness**)
- we need to apply and calculate ICZM indicator at different spatial scales and governance levels, and benchmark it in and between different regions, to test robustness of developed calculation methodology (**methodology robustness**)
- we need to interpret ICZM indicator results at different spatial scales, governance levels, to test **availability of data and robustness of datasets**
- we need to test and validate cause-effects between driver -pressure-impacts-state-response and capture it by the combination of selected indicators

3.4.3 Integration of Indicators with other PEGASO products.

Consistently with the multiple-scale PEGASO approach the selected indicators have to be applicable in a wide range of spatial scales (i.e. local, national and regional) and have to be linked with the other PEGASO Tools (WP4) and products (Spatial Data Infrastructure (WP3)).

Examples of methodological integration between the set of indicators and other ICZM WP4 tools are listed below:

- To cover and analyse the spatial dimension of the PEGASO indicators, the spatially explicit indicators can be integrated with the [LEAC/SEAC](#) (task 4.2)
- The PEGASO indicator set can provide the tool for a DPSIR baseline assessment of current and past coastal and marine system pressure, state and impacts, against which trends can be analysed, and in which future projections can be assessed through **scenario development** (Task 4.3)
- Economic indicators can be a component of the **socio-economic evaluation** (Task 4.5)
- The selection and the identification of appropriate indicators for specific CASEs should be done applying **participation** ([Participation methods report](#)) (Task 4.4)

Within the PEGASO project, the ICZM Platform will be supported by the development of a **Spatial Data Infrastructure (SDI)** and the suite of sustainability assessment tools required for making multi-scale integrated assessments in the coastal zone by supporting and creating local geonodes in order to deliver a Mediterranean and Black Sea harmonised sets of data accessible through an Internet viewer. PEGASO will support harmonization of data and metadata, which are the key to build assessment tools (WP4) and to support the regional assessment (WP5).

3.5.3 Examples at local and regional scales

Indicators are a tool that can be applied at different scale in the PEGASO project

How to chose and test indicators in PEGASO CASES

1. Consider the CASE objectives and think of what should be the role of the indicator (Compliance indicators, effectiveness indicators, coastal management indicators) (see paragraph 2.2 for details)
2. Compare the CASE objectives with the policy objectives of Indicator core set Table in Annex II choosing those ones that better match the CASE needs.
3. Select the indicator(s) of the policy objective set that better describe the issue.
4. Bearing in mind the other objectives of the CASE, link the chosen indicator(s) with other ones from the Core set table* considering the relation among them (driving force, pressure, state Impact response)
5. Test the indicators

*Eventually you can choose other indicators from the indicator set file ([Indicator set file](#))

Please remember that the choice of indicators should be done using a participatory method ([Participation methods report](#)) (Task 4.4)

Example

Case:Al Hoceima coast (Morocco)

1. **Consider the CASE objectives and think of what should be the role of the indicator (Compliance indicators, effectiveness indicators, coastal management indicators) (see paragraph 2.2 for details)**

One of the most relevant coastal issue in the Al Hoceima coast CASE is related to climate change impacts such as erosion. One of the objective is therefore the assessment of the coastal vulnerability to climate change. The role of the indicator(s) to be chosen should be to assess the state of the coastal environment therefore a **Coastal management indicator**

2. **Compare the CASE objectives with the policy objectives of Indicator core set Table in Annex II choosing those ones that better match the CASE needs.**

Looking at the Core set table in Annex II, the CASE objective to assess the coastal vulnerability to climate change expecially linked to phenomena like erosion, comply to the policy objective **“To prevent damage to coastal environment, and appropriate restoration if damage already occurred”**.

3. **Select the indicator(s) of the policy objective set that better describe the issue.**

Within this policy objective several indicators can be found but **Areal extent of coastal erosion and coastal instability (indicator n. 17)** is the indicator that can better describe the problem.

4. Bearing in mind the other objectives of the CASE, link the chosen indicator(s) with other ones from the Core set table* considering the relation among them (driving force, pressure, state Impact response)

The other objectives of the CASE are to increase the well being of the local population and develop coastal adaptation strategies to climate change. Therefore the chosen indicator can be link both to other indicators of the same policy objectives and to other ones placed in two other policy objectives set:

- **To prevent damage to coastal environment, and appropriate restoration if damage already occurred** (Measuring the area subject to physical disturbance can be useful to determine possible pressures that increase erosion phenomena. Moreover Risk assessment can be the first response to develop to understand how much the population and human activities are under risk of erosion)
 - o Indicator n.18: Areal extent of sandy areas subject to physical disturbance (beach cleaning by mechanical means, sand mining and beach sand nourishment)
 - o Indicator n.19: Risk assessment: economic assets at risk of storm surges and coastal flooding (considering sea level rise scenario's and return periods of storm surges)
 - o Indicator n.21: Risk assessment: Population living in the at risk area of storm surges and coastal flooding (considering sea level rise scenario's and return periods of storm surges)
- **To formulate land-use strategies, plans, and programmes covering all coastal and marine uses** (The lack of a plan can be the cause of wrong land use of coastal vulnerable zones)
 - o Indicator n.4: A governance system and legal instrument in support of Marine Spatial Planning is in place. (Yes / No)
 - o Indicator n.5: There are spatial development plans which include the coastal zone but do not treat it as a distinct and separate entity.
- **To have a balanced use of coastal zone, and avoid urban sprawl** (the trend of population living in a risk area should be identify)
 - o Indicator n. 13: Changes in size, density, and proportion of the population living on the coast

5. Test the indicators

How to choose indicators for the Regional Assessment

The PEGASO Regional Assessment (RA) will be designed to address the complexity of multidimensional issues related to the coastal and marine environment of the Mediterranean and the Black sea with the specific objectives to (1) build a multidisciplinary assessment of best available information, (2) inform policy, and (3) support decision making in the context of the ICZM protocol. The PEGASO RA is intended to go beyond the merely 'state of the environment' report. The main objective of the Regional Assessment is to thoroughly analyze how human activities are impacting ecosystems, and their ability to continue to provide ecosystem services rather than fully assessing the state of marine and coastal ecosystems. It will give a particular focus on information about trends and future changes and will include scenarios and socio-economic valuation. The PEGASO RA is intended to be a policy-oriented tool with two specific objectives: informing the relevant policy and decision-makers on how to implement the ICZM Protocol in the Mediterranean and how to pave the way towards the development of a similar legal instrument in the Black Sea

In the context of the Regional Assessment indicators have twofold objective;

1. Describe a storyline i.e. describe relevant phenomena in the Mediterranean and Black sea by considering cause-effect relationship
2. Provide the baseline for the scenario exercise

In Annex V a preliminary proposal for the RA set is presented. This selection has been made by considering the following steps:

1. Selection of policy objectives (i.e. main issues for the basins)
 - a. Preserve the wealth of natural capital in coastal zone
 - b. To give priority to public services and activities requiring the proximity to the sea, and to take into account the specific characteristics of the coastal zones when deciding about coastal uses
 - c. To prevent damage to coastal environment, and appropriate restoration if damage already occurred
2. Definition of a conceptual framework (TWAP scheme, DPSIR modified)
3. Selection of indicators

Further discussion will be needed with partners in order to arrive to a shared decision about RA set.

3.5 Next steps

Next steps of task 4.1 will mainly regard the application phase of the indicators. Important milestones (i.e. meetings and capacity building events) will have to take into account in order to deliver the needed products.

Below a table describing main next steps is presented

1	Task	Note	Timing	Milestone	Status
2	Compilation of methodological factsheets	Methodological factsheets for the core indicator set should be compiled by key partners	Month 28 (April 2012) To Month 29 (May 2012)	WP4 meeting 6-8 June	In progress
3	Preparation of training material	To be discussed with WP6	Month 30 (June 2012) To Month 33 (October 2012)	VIC 1st or 2nd week of October 2012	To be started
4	Implementation	The implementation task will include the inventory of data for indicators (link with WP3), test and application of indicators and compilation of the factsheet. This sub-task is strictly linked with WP5.	Month 29 (May 2012) To month 35 (December 2012)	July 2012 CASES meeting Second part of October 2012 Regional Assessment meeting November 2012 and December 2012 Regional Workshop (see Capacity Building Plan) Rabat General Meeting	To be started

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ANNEX I

Redrafted ICZM Principles and policy objectives of ICZM Protocol Article 6.

Redrafted ICZM Principles

1. ICZM seeks to take account of the wealth of natural capital in coastal zones represented by ecosystems and the output of ecosystem services that depend on the complementary and interdependent nature of marine and terrestrial systems. Thus policy makers and managers should consider the effects of their actions and activities on those social, economic and environmental systems that affect the coastal zone or are affected by processes within it, by considering the cross-sectoral implications of all plans and policies.
2. All elements relating to hydrological, geomorphological, climatic, ecological, socio-economic and cultural systems shall be taken into account in an integrated manner, so as not to exceed the carrying capacity of the coastal zone and to prevent the negative effects of natural disasters and of development. Policies and plans in the coastal zone should therefore ensure that ecosystems are managed within the limits of their functioning.
3. The ecosystem approach to coastal planning and management should be designed to ensure the sustainable development of coastal zones. This implied that not only should ecosystems be managed within the limits of their functioning, but also that full account is taken of the varying temporal scales and lag-effects that characterize ecosystem processes. As a result, ICZM should look to the long-term so that sustainable development can be achieved.
4. Appropriate governance allowing adequate and timely participation in a transparent decision-making process by local populations and stakeholders in civil society concerned with coastal zones shall be ensured. In doing so ICZM recognises that the management of land, water and living resources is a matter of societal choice. This will require that all relevant sectors of society and scientific disciplines should be involved in framing the options, and that all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices be taken into account. In particular the way different groups value ecosystem services should be understood.
6. Given the requirement for cross-sectoral management approaches in the coastal zone, the institutions dealing with social, economic and environmental issues must themselves be organised to ways that allow integrated approaches to the developed. This will require that appropriate institutional capacity be built and that decision

Policy objective

Preserve the wealth of natural capital in coastal zone

Not to exceed the carrying capacity of the coastal zone

Adopt a long-term approach to fully take into account temporal scales

To ensure appropriate governance allowing adequate and timely participation in a transparent decision-making process of all relevant social actors

To ensure cross-sectoral coordination among competent authorities

- makers should be compete
7. nt in using all the forms of evidence that needs to be taken into account.
 6. The formulation of land use strategies, plans and programmes covering urban development and socio-economic activities, as well as other relevant sectoral policies are needed for successful ICZM. However, their impacts need to be assessment, and the implications considered in terms of the trade-offs between
 - To formulate land-use strategies, plans, and programmes covering all coastal and marine uses
 - the natural, economic, social and cultural capitals.
 7. ICZM is essentially place-based and should take account of geographical context. In particular, it must recognise and communicate the particular qualities, characteristics and opportunities in the coastal zone that arise from
 - the proximity of land and sea, and take steps to protect and sustain them. Thus management should be decentralized to the lowest appropriate level to ensure that management or policy goals are understood and owned by those who affect their implementation and success.
 - To give priority to public services and activities requiring the proximity to the sea, and to take into account the specific characteristics of the coastal zones when deciding about coastal uses
 8. The allocation of uses throughout the entire coastal zone should be balanced.
 - To have a balanced use of coastal zone, and avoid urban sprawl
 9. Preliminary assessments shall be made of the risks associated with the various human activities and infrastructure so as to prevent and reduce their negative impact on coastal zones. Although such risk assessments should take account of
 - the limits of ecosystem function, assessment must also recognise that change is inevitable, and so must be updated by periodic assessments in the light of changing circumstances. ICZM must be framed as an adaptive process.
 - To perform Environmental Impact Assessment for human activities and infrastructures
 10. Damage to the coastal environment shall be prevented and, where it occurs, appropriate restoration shall be effected.
 - To prevent damage to coastal environment, and appropriate restoration if damage already occurred

ANNEX II
UNEP MAP Ecological Objectives
From:
Draft decision on implementing MAP Ecosystem Approach roadmap:
Mediterranean
Ecological and Operational Objectives, Indicators and Timetable for
implementing the
ecosystem approach roadmap

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Ecological Objective	Operational Objectives	Indicators
1 Biodiversity		
Biological diversity is maintained or enhanced. The quality and occurrence of coastal ¹ and marine habitats ² and the distribution and abundance of coastal ³ and marine species ⁴ are in line with prevailing physiographic, hydrographic, geographic and climatic conditions	8.2 Key coastal and marine habitats are not being lost	8.2.3 Potential / observed distributional range of certain coastal and marine habitats listed under SPA protocol 8.2.3 Distributional pattern of certain coastal and marine habitats listed under SPA protocol 8.2.3 Condition of the habitat defining species and communities
7 Hydrography		
Alteration of hydrographic conditions does not adversely affect coastal and marine ecosystems.	7.2 Alterations due to permanent constructions on the coast and watersheds, marine installations and seafloor anchored structures are minimized	7.2.1 Impact on the circulation caused by the presence of structures 7.2.3 Trends in sediment delivery, especially in major deltaic systems 7.2.4 Extent of area affected by coastal erosion due to sediment supply alterations
8 Coastal ecosystems and landscapes		
The natural dynamics of coastal areas are maintained and coastal ecosystems and landscapes are preserved	8.1 The natural dynamic nature of coastlines is respected and coastal areas are in good condition 8.2 Integrity and diversity of coastal ecosystems, landscapes and their geomorphology are preserved	8.1.1 Areal extent of coastal erosion and coastline instability 8.1.2 Changes in sediment dynamics along the coastline 8.1.3 Areal extent of sandy areas subject to physical disturbance 8.1.4 Length of coastline subject to physical disturbance due to the influence of manmade structures 8.2.1 Change of land-use 8.2.2 Change of landscape Types 8.2.3 Share of nonfragmented coastal habitats

Annex III

The Indicator Core Set

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Policy objective¹

	N. ²	Indicator	Description	ICZM Protocol referring article	UNEP-MAP Ecological objectives ³
Preserve the wealth of natural capital in coastal zone	1 (1)	Distributional pattern of certain marine and coastal habitats under the Specially Protected Areas (SPA) Protocol	This indicator helps to describe the presence of relevant habitats according to the SPA Protocol of the Barcelona Convention. The indicator refers to Art. 4 of the SPA Protocol that addresses the coastal and marine ecosystems endangered or relevant because of scientific, aesthetic, cultural or educational interest. The area should fulfill at least one of the criteria of art. 8.2 (importance for conserving biodiversity, containing ecosystems specific to the Mediterranean area or endangered species, relevant because of scientific, aesthetic, cultural or educational interest).	6 (general principles of ICZM) a,b,c, 8 (protection and sustainable use of the coastal zone), 10 (specific coastal ecosystem),11 (coastal landscape),12 (islands) ,13 (cultural heritage)	1.4.1 Potential / observed distributional range of certain coastal and marine habitats listed under SPA protocol 1.4.2 Distributional pattern of certain coastal and marine habitats listed under SPA protocol
	2 (3)	State of the main commercial fish stocks by species and sea area	This indicator helps measuring changes in fish stock in order to identify human pressure on aquatic environment and plan fishing intensity	9 (economic activities)2b(fishing)	
	3 (4)	Effective management of protected areas: share of coastal and marine habitats and species listed under international agreements (SPA protocol) that are in good condition (favorable, unfavorable etc.)	This indicators help to describe the level of protection of relevant ecosystems that include specific species. The referring species are listed in the Annex II (endangered or threatened species) and Annex III (species whose exploitation is regulated) of the SPA Protocol	6 (general principles of ICZM) a,b,c, 8 (protection and sustainable use of the coastal zone), 10 (specific coastal ecosystem),11 (coastal landscape),12 (islands) ,13 (cultural heritage)	1.4.3 Condition of the habitat defining species and communities

¹ Reference to the ICZM protocol- art.6 general objectives of ICZM

² In parenthesis the referring number of the complete indicator list available on the PEGASO Intranet

³Reference to the UNEP(DEPI)/MED WG 363/7/Corr.1 Draft decision on implementing MAP Ecosystem Approach roadmap: Mediterranean Ecological and Operational Objectives, Indicators and Timetable for implementing the ecosystem approach roadmap

Policy objective	N.	Indicator	Description	ICZM Protocol referring article	UNEP-MAP Ecological indicators
To formulate land-use strategies, plans, and programmes covering all coastal and marine uses	4 (15)	A governance system and legal instrument in support of Marine Spatial Planning is in place. (Yes / No)	This indicator gives description of the presence of institutions or agencies in charge of the development and implementation of marine spatial planning strategies by means of suitable legal instruments	6 (general principles of ICZM) f, 18 (national coastal strategies, plans and programmes), 20 (land policy)	
	5 (18)	There are spatial development plans which include the coastal zone but do not treat it as a distinct and separate entity.	This indicator helps to determine whether the coastal area is addressed with specific planning tool	6 (general principles of ICZM) f, 18 (national coastal strategies, plans and programmes), 20 (land policy)	
To give priority to public services and activities requiring the proximity to the sea, and to take into account the specific characteristics of the coastal zones when deciding about coastal uses	6 (19)	Economic production per sector (turnover)	The indicator is a description of the relative importance of one sector of the marine economy relative to another sector (generally in comparison to their relative importance to the total economy of the management area).	9 (economic activities), 9.1e	
	7 (20)	Employment structure	This indicator gives a description of the employment by economic activity, employment status and place of work	9 (economic activities)	
	8 (21)	Percentage of economic activities area in the coastal area	this indicators gives an idea of the intensity of the coastal activity	9 (economic activities)	
	9 (22)	Value added per sector	This indicator reflects the creation of wealth of each coastal sector.	9 (economic activities)	
	10 (37)	Land use flows: The area of new developments and its share on previously developed and undeveloped land in the coastal zone	This indicator describes the trend of the coastal land use during time helping to understand if, where and how urban sprawl occurred.	6 (general principles of ICZM)h	8.2.1 Change of land-use

Policy objective	N.	Indicator	Description	ICZM Protocol referring article	UNEP-MAP Ecological indicators
To have a balanced use of coastal zone, and avoid urban sprawl	11 (38)	Area of built-up space in the coastal zone (both the emerged and submerged area of the coastal zone)	This indicator gives a description of the coastal area subject to the construction of facilities and infrastructures.	6 (general principles of ICZM) e; 9(economic activities) f	
	12 (39)	Water efficiency index	This index allows the monitoring of progress in terms of the water saved as a result of demand management by reducing loss and wastage during both the transport and use of water. It is subdivided into total and sectoral efficiency (drinking water, agriculture and industry).	9.1.c (economic activities)	
	13 (41)	Changes in size, density, and proportion of the population living on the coast	This indicator describes the trend of population flow and number in the coastal zone compared to the inland.	6 (general principles of ICZM)h	
To perform Environmental Impact Assessment for human activities and infrastructures	14 (44)	Bathing water quality	This indicator gives a description of the quality of the bathing water according to specific parameters.	16 (monitoring activities and observation mechanism and network), 19 (environmental assessment)	
	15 (46)	Number of hypoxia events or extent of hypoxic areas	This indicator gives information about the occurrence of oxygen depletion in coastal waters due to events like eutrophication.	16 (monitoring activities and observation mechanism and network), 19 (environmental assessment)	
	16 (52)	Trends in the amount of litter washed ashore and/or deposited on coastline	This indicator can give a description of the quality of the shore depending on the presence of litter.	9 (economic activities) c (waste management)	10.1.1 Trends in the amount of litter washed ashore and/or deposited on coastlines, including analysis of its composition, spatial distribution and, where possible, source

Policy objective	N.	Indicator	Description	ICZM Protocol referring article	UNEP-MAP Ecological indicators
To prevent damage to coastal environment, and appropriate restoration if damage already occurred	17 (58)	Areal extent of coastal erosion and coastal instability	This indicator can give a description of the vulnerability of the coastal zone to events that can cause erosion and instability of the coastline.	6 (general principles of ICZM), 23 (erosion)	
	18 (61)	Areal extent of sandy areas subject to physical disturbance (beach cleaning by mechanical means, sand mining and beach sand nourishment)	This indicator gives a description of the coastal area subject to physical disturbance caused by human activities.	9 (economic activities) e	
	19 (62)	Risk assessment: economic assets at risk of storm surges and coastal flooding (considering sea level rise scenario's and return periods of storm surges)	This indicator gives information about the economic assets under risk of natural extreme events.	6j (general principles of ICZM) 22 (natural hazards), 23 (coastal erosion), 24 (response to national disasters)	
	20 (63)	Risk assessment: biological diversity (habitats/species) at risk of storm surges and coastal flooding (considering sea level rise scenario's and return periods of storm surges)	This indicator gives information about the natural resources under risk of natural extreme events	6 (general principles of ICZM) 22 (natural hazards), 23 (coastal erosion), 24 (response to national disasters)	

21 (64)	Risk assessment: Population living in the at risk area of storm surges and coastal flooding (considering sea level rise scenario's and return periods of storm surges)	This indicator gives information about the population possibly harmed by risk of natural extreme events	6 (general principles of ICZM) 22 (natural hazards), 23 (coastal erosion), 24 (response to national disasters)	
22 (65)	Productive and protected areas lost due to siltation, saltwater intrusion	This indicator helps to check if there is a loss in productivity or biodiversity due to specific sea water impacts in coastal zones	6 (general principles of ICZM) 22 (natural hazards), 23 (coastal erosion), 24 (response to national disasters)	
23 (66)	Sea surface temperature	This indicator gives a description of the trend of the sea surface temperature	6j (general principles of ICZM) 22 (natural hazards), 23 (coastal erosion), 24 (response to national disasters)	
24 (67)	Sea Level rise (including SLR relative to land cfr land subsidence)	This indicator gives information about the local sea level rise resulting from local subsidence and the level of the sea	6j (general principles of ICZM) 22 (natural hazards), 23 (coastal erosion), 24 (response to national disasters)	

The ICZM protocol articles considered in the core indicators are listed below (the non considered articles are in red). The overall PEGASO task 4.1 considers the ICZM Protocol article 27 EXCHANGE OF INFORMATION AND ACTIVITIES OF COMMON INTEREST, in particular the comma 2(a) “define coastal management indicators, taking into account existing ones, and cooperate in the use of such indicators”.

<i>Article 6</i>	GENERAL PRINCIPLES OF INTEGRATED COASTAL ZONE MANAGEMENT
<i>Article 7</i>	COORDINATION
<i>Article 8</i>	PROTECTION AND SUSTAINABLE USE OF THE COASTAL ZONE
<i>Article 9</i>	ECONOMIC ACTIVITIES
<i>Article 10</i>	SPECIFIC COASTAL ECOSYSTEMS
<i>Article 11</i>	COASTAL LANDSCAPES
<i>Article 12</i>	ISLANDS
<i>Article 13</i>	CULTURAL HERITAGE
<i>Article 14</i>	PARTICIPATION
<i>Article 15</i>	AWARENESS-RAISING, TRAINING, EDUCATION AND RESEARCH
<i>Article 16</i>	MONITORING AND OBSERVATION MECHANISMS AND NETWORKS
<i>Article 17</i>	MEDITERRANEAN STRATEGY FOR INTEGRATED COASTAL ZONE MANAGEMENT
<i>Article 18</i>	NATIONAL COASTAL STRATEGIES, PLANS AND PROGRAMMES
<i>Article 19</i>	ENVIRONMENTAL ASSESSMENT
<i>Article 20</i>	LAND POLICY
<i>Article 21</i>	ECONOMIC, FINANCIAL AND FISCAL INSTRUMENTS
<i>Article 22</i>	NATURAL HAZARDS
<i>Article 23</i>	COASTAL EROSION
<i>Article 24</i>	RESPONSE TO NATURAL DISASTERS
<i>Article 25</i>	TRAINING AND RESEARCH
<i>Article 26</i>	SCIENTIFIC AND TECHNICAL ASSISTANCE
<i>Article 27</i>	EXCHANGE OF INFORMATION AND ACTIVITIES OF COMMON INTEREST
<i>Article 28</i>	TRANSBOUNDARY COOPERATION
<i>Article 29</i>	TRANSBOUNDARY ENVIRONMENTAL ASSESSMENT

ANNEX IV

The questionnaire

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Contact

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- 1) the questions refer to the PEGASO set of ICZM indicators that can be found in task 4.1 folder on PEGASO intranet
- 2) with this questionnaire we want to capture the practical "hands-on" experiences of those who used/tested/calculated one or more of the indicators listed in the PEGASO set, even if the(se) indicator(s) we applied in a different policy context or purpose.

For the sake of clarity in the questionnaire: we make use of different terms like apply, test, calculate, and use indicators.

Use= Test (experimental phase) and then apply (more formal phase)

Testing includes calculating and data handling

Applying is needed in order to evaluate concept (definition, relevance within policy framework, sustainability criteria)

Calculating is needed in order to evaluate output (robustness, availability, appropriateness of data, etc....) and needs data and calculation method

USE AND EFFECTIVENESS OF INDICATORS: feedback Questionnaire

For each of the indicators used, please complete the following questionnaire. The aim of this questionnaire is to assess the relevance of the PEGASO indicators set. Your feedback is essential to achieve a final set of relevant and useful indicators.

If you tested/applied a particular indicator at different scales, please fill in two separate questionnaires for this indicator.

Q1 Name and number of the indicator:

Q2 At which scale was the indicator tested/applied? (one answer per questionnaire)

- ☐ local
☐ national
☐ regional

Q3 Where did you test/apply the indicator (name of the region, country, county, territorial waters, Exclusive Economic Zone...?)

Q4 Which ICZM policy objective or which policy framework did you want to assess with this indicator?

Q5 Was the indicator easy to calculate

- ☐ we did not succeed in calculating the indicator (go to question n°6)
☐ we succeeded in calculating the indicator although with some degree of difficulty (go to question n°7)
☐ the indicator was easy to calculate (go to question n°7)
☐ the indicator was already calculated in existing database. Which database did you use? (ex: FAO, etc.) _____ (go to question n°7)

Q6 If you did not succeed in calculating indicator, it was due to:

- ☐ a lack of available, reliable, appropriate data to calculate the indicator

A lack of data at a relevant temporal or spatial scale
☐ the methodology to calculate the indicator is too complex or complicated, or not robust/reliable enough
☐
☐ other (detail): _____

Q7 If you succeeded in testing/applying the indicator, did you think

☐ it was very useful to assess the ICZM objective
☐ it was useful to assess the ICZM objective
☐ it was not really useful to assess the ICZM objective
☐ it was not useful at all to assess the ICZM objective
 If not useful at all, why not.....

Q8 Did you make cross-linkages between this indicator and other indicators?

☐ Yes. With which one? (go to question n°9)

☐ No. Why? _____
 (go to question n°10)

Q9 Did cross-connection between indicators help you to identify cause-effect phenomenon within the DPISR framework?

☐ Yes. Give short overview of the results

☐ No. Why not?

Q10 In the end, did you succeed in assessing the mentioned ICZM policy objective (thanks to the mentioned indicator but also other indicator)?

☐ Yes
☐ No
 If not, what amendments would be required to the indicator formulation/calculation methods in order to improve its relevance or usefulness

To be returned to Task 4.1 leader
 Francesca Santoro
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Annex V

Regional Assessment Indicator set proposal

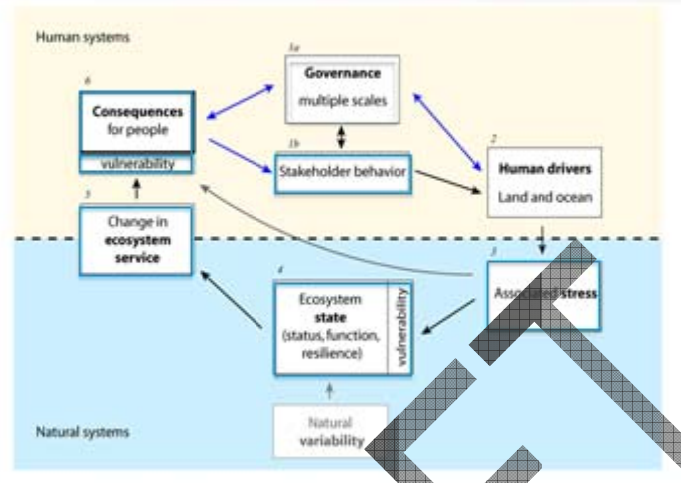
Objective of this power point:

- **Make a proposal for the core set of indicators**
 - Rationale for the selection
 - ICZM Protocol main issues and UNEP-MAP ecological objectives
 - Possibility of linking with Task 4.2 (LEAC/SEAC)
 - Possibility of multi-scale application (CASES and Regional Assessment)

Regional Assessment objectives

- Propose a methodological approach (on the basis of the review of previous regional assessments) to integrate knowledge and information for the implementation of the ICZM Protocol
 - Integrated assessment of main threats and issues in the Mediterranean and Black Sea (what is the status, which are the causes, what are the solutions (through scenarios), comparison of different solutions)
 - Integration of PEGASO tools and results
 - Integration of knowledge and information across scales (up-scale and down-scale)
 - Integration among human and natural systems

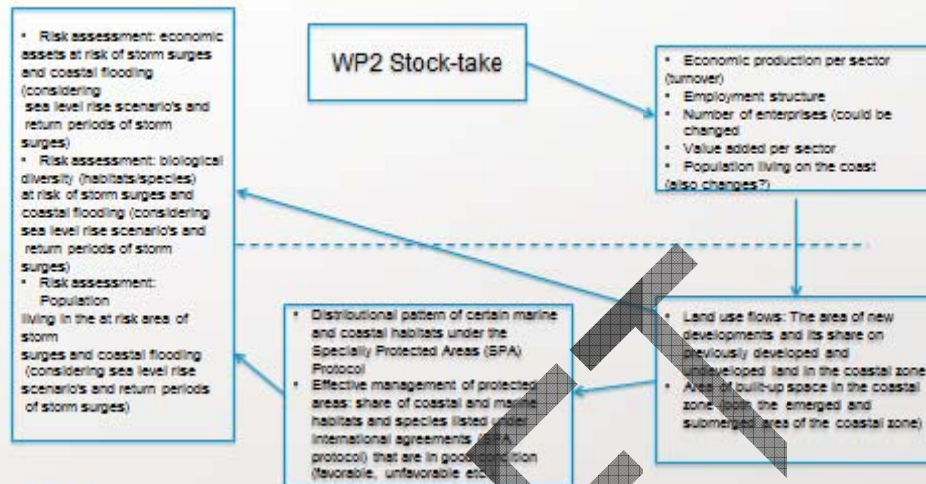
Conceptual framework proposal (to be used as starting point, it can be modified to better fit PEGASO framework) in the following slide the each box will be filled with the proposed indicators



Rationale behind the FA set proposal

- Develop a storyline
 - Starting from the description of the governance framework (through the stock-take)
 - From main human drivers (economic and population)
 - Deriving information on one of the main important pressure in the coastal zone (also important issue in the ICZM Protocol): urban sprawl
 - Link to information on its impacts on coastal habitats, and coastal vulnerability
 - This information can be enriched with other information derived from task 4.2, can be projected in the future through scenarios and can be the basis for deriving policy options

Proposal for RA indicator set



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